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Jansen, C. J. M. ; Davis, Burt

Published in:
Communicatio; South African Journal for Communication Theory and Research

DOI:
10.1080/02500167.2016.1209536

Publication date:
2016

Routledge
Taylor & Francis Group

Communicatio

South African Journal for Communication Theory and Research

ISSN: 0250-0167 (Print) 1753-5379 (Online) Journal homepage: http://www.tandfonline.com/loi/rcsa20

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Burt Davis & Carel Jansen

To cite this article: Burt Davis & Carel Jansen (2016) This May Come As a Surprise: How Prior Knowledge of Information in a Fear Appeal is Associated with Message Outcomes, Communicatio, 42:3, 398-421, DOI: 10.1080/02500167.2016.1209536

To link to this article: http://dx.doi.org/10.1080/02500167.2016.1209536

Published online: 23 Sep 2016.

THIS MAY COME AS A SURPRISE: HOW PRIOR KNOWLEDGE OF INFORMATION IN A FEAR APPEAL IS ASSOCIATED WITH MESSAGE OUTCOMES

Burt Davis
Africa Centre for HIV/AIDS Management
Stellenbosch University
burt@sun.ac.za

Carel Jansen
Communication and Information Studies
University of Groningen
c.j.m.jansen@rug.nl

ABSTRACT

Two related studies were performed aimed at finding if and how prior knowledge of threat and efficacy information in a fear appeal message is associated with message outcomes (attitude and behavioural intentions). The Extended Parallel Process Model (EPPM) (Witte 1992; 1998) served as theoretical framework for one study about a chlamydia fear appeal (n = 57) and another about an alcohol abuse fear appeal (n = 59). Findings from both studies suggest that

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Routledge Taylor & Francis Group

Communicatio
Volume 42 | Number 3 | 2016
pp. 398–421

DOI: 10.1080/02500167.2016.1209536
Print ISSN 0250-0167 | Online 1753-5379

prior knowledge of threat information is hardly relevant for readers' reactions to a fear appeal message. Prior knowledge of efficacy information, however, proved to play a more important role, most often in a positive way. Findings from both studies furthermore suggest that the EPPM may be incorrect in assuming that individual differences – in this case, in prior knowledge – may only affect fear appeal outcomes in an indirect way, that is through different perceptions of threat and efficacy.

Keywords: Extended Parallel Process Model (EPPM); fear appeal; health communication; individual differences; prior knowledge

INTRODUCTION

One type of intervention often used in health communication is to present people with a fear appeal message. Witte (1992, 329) defines these as persuasive messages designed to scare people by describing the terrible things that will happen to them if they fail to do what the message recommends (see also Witte 1998; Yzer, Southwell and Stephenson 2013). The information in a fear appeal message typically comprises a threat component (e.g., the threat of HIV infection) and an efficacy component (e.g., effectively using condoms to prevent HIV) (Popova 2012; Witte 1992; 1998). In many cases, for part of the target group of a fear appeal, information in the message will be new, while other members of the group may already be familiar with the information. This begs the question to what extent differences in prior knowledge may be associated with different message outcomes and how such possible differences may be explained.

EARLIER STUDIES INTO THE ROLE OF PRIOR KNOWLEDGE IN FEAR APPEALS

Experimental studies manipulating the information in a fear appeal, such that in one condition the information was more familiar to participants than in another condition, show that prior knowledge does not always deliver the same results. High prior knowledge about campus rape was associated with higher levels of perceived threat about rape (Morrison 1994). From a fear appeal study about testicular cancer, Morman (2000) concludes that perceived knowledge about how to perform a testicular self-exam (TSE) was positively associated with attitudes and intentions to perform such a self-exam. Averbeck, Jones and Robertson (2011) studied the effects of high and low prior knowledge of information included in two fear appeals – one about sleep deprivation and the other about spinal meningitis. In this study, prior knowledge had a significant, negative effect on fear. Furthermore, in the sleep deprivation case, perceived response efficacy was highest in the high

prior knowledge condition, while in the spinal meningitis case perceived response efficacy was highest in the low prior knowledge condition. No effects were found on perceived threat. Jansen, Hustinx and Langeveld (2013) studied the effects of familiarity with information included in a fear appeal message about frequent exposure to loud music. They conclude that prior knowledge led to less positive intentions to take the measures the message advised. No distinction was made here, however, between prior knowledge of the threat presented and prior knowledge of the recommended measures. Nabi, Roskos-Ewoldsen and Dillman Carpentier (2008), in a study about fear appeal messages regarding TSE, report that men in the high subjective knowledge about testicular cancer group had more favourable attitudes toward performing a TSE when experiencing a lower (vs. a higher) level of fear arousal, but there was no significant difference in attitude for men in the low subjective knowledge group. In an earlier study on the same subject, Steffen (1990, 694) found that the effect of a TSE brochure was stronger for men without (versus with) prior TSE knowledge. It is not clear, however, if the brochure used in this study can be considered as a fear appeal message, as according to the author it focused less on the severity of the disease than on its curability if detected early. Furthermore, it is not clear if prior knowledge in this study referred to prior knowledge about both testicular cancer and testicular self-exams, or only to testicular self-exams (Steffen 1990, 686 and 688).

As Nabi, Roskos-Ewoldsen and Dillman Carpentier (2008, 193) remark, the connection between prior knowledge and fear appeals has been largely overlooked. Indeed, current fear appeal theories offer little clarification in this regard (see Ruiter, Kessels and Peters et al. 2014; Tannenbaum, Hepler and Zimmerman et al. 2015; Witte and Allen 2000 for overviews of fear appeal theories and research). Extant literature shows that only a few studies have investigated the influence of prior knowledge of the threat and efficacy information in a fear appeal on message outcomes. These studies (referred to above) all tested prior knowledge as an independent variable, trying to find *whether* this variable has an effect on the outcomes. They offer little insight, however, into *how* prior knowledge of the threat and efficacy information may be associated with people's perceptions of, and subsequent reactions to, a fear appeal.

Popova (2012), in her review of the Extended Parallel Process Model (EPPM; the most influential theory in fear appeal literature – see below), notes that the theory appears to assume that audiences have no prior knowledge of either the threat or the response element in a fear appeal message. Popova asserts that the EPPM does include previous emotions and cognitions as individual differences that affect message processing, but does not specify how pre-existing fear or knowledge about threat or efficacy might interact with the message. However, previous familiarity with the threat and/or responses would affect message processing in important ways. Popova (ibid, 468) further remarks that recently studies such as Roskos-Ewoldsen and Dillman Carpentier (2008) have begun to challenge this assumption.

In sum, findings from earlier studies suggest that the level of prior knowledge with threat or efficacy information may or may not influence the outcomes of presenting people with a fear appeal, and if it does, the outcomes may be affected in either a positive or a negative way. No research is available that helps to predict whether familiarity with threat and efficacy information in a fear appeal message will be positively or negatively associated with receivers' reactions to the message.

Three possibilities arise: one possibility is that prior knowledge of information included in a fear appeal message will be *positively associated* with attitudes and intentions after reading such a message. Receivers' dominant response to a persuasive message that is consistent with their existing attitude is to generate pro-message arguments (Steffen 1990, 685, referring to the Elaboration Likelihood Model of Petty and Cacioppo 1986), and knowledgeable readers may already hold a more positive prior attitude than less knowledgeable readers. Another possibility, however, is that prior knowledge of information included in a fear appeal message is *negatively associated* with attitudes and intentions after reading such a message. If knowledgeable readers have already dismissed the information included in the fear appeal message they may not be willing to change their attitudes or intentions, while less knowledgeable readers may still be open to the arguments in the fear appeal message. Finally, prior knowledge may be *neither negatively nor positively associated* with attitudes and intentions after reading a fear appeal message. For knowledgeable readers, the message may include little or no new information, and hence their attitudes and intentions may remain at the same levels. For less knowledgeable readers, on the other hand, the new information they notice in the message may influence their attitudes and intentions in a positive way. As a result, after reading the fear appeal message, attitudes and intentions may be roughly the same for knowledgeable and less knowledgeable readers.

In view of the need for greater insight into the associations of prior knowledge on the one hand, and attitudes and intentions after reading fear appeal messages on the other hand, two related studies were performed. The first goal of these studies was to examine whether prior knowledge of threat and efficacy information in a fear appeal message is positively or negatively associated with the receivers' attitudes and behavioural intentions. The second goal was to find out whether such associations would be of a direct or an indirect nature, as the EPPM suggests (see below).

CONCEPTUALISING THE EFFECT OF PRIOR KNOWLEDGE OF INFORMATION

As mentioned, no theoretical fear appeal framework is available that explicitly explains how the level of prior knowledge of the threat and efficacy information in a fear appeal may be associated with the way people perceive this information or how, as a consequence of their perceptions, it may be related to their reactions. The

EPPM, developed by Witte (1992; 1998), however, provides some guidance in this regard.[1]

Key EPPM constructs are the emotion of *fear*; the cognition of *threat* with its dimensions *severity* and *susceptibility*; the cognition of *efficacy* with its dimensions *perceived response efficacy* and *self-efficacy*; and three types of outcomes (no response, danger control response and fear control).

In essence, the EPPM hypothesises that if people do not perceive the threat to be serious, there will be no response. If, however, people perceive a high level of threat resulting from a high level of perceived severity and a high level of perceived susceptibility, they will get scared (high fear). If the level of fear is high, there will be either a danger control or a fear control response, depending on the level of perceived efficacy. If perceived efficacy resulting from a high level of perceived response efficacy and a high level of perceived self-efficacy is higher than perceived threat, then a rational reaction (i.e., a danger control response) is predicted: attitudes, intentions and/or behavioural changes in accordance with a message's recommendations. If the level of fear is high, but perceived efficacy is lower than perceived threat, then an emotional reaction (i.e., a fear control response) is predicted: defensive avoidance, denial and/or reactance.

In her introduction of the EPPM, Witte (1992, 338) remarks that each person evaluates the components of a fear appeal in relation to his/her prior experiences, culture and personal characteristics. Witte (1998, 431 and 439) elaborates by stating that according to the EPPM, individual differences only influence outcomes indirectly, as mediated by threat and efficacy. Witte and Morrison (2000) argue that differences between people, for instance in personality traits (e.g., anxiety and locus of control), in demographic variables (e.g., age, gender, socioeconomic status) and also in prior experiences leading to different interpretations of the same event, may influence how someone perceives a fear appeal message and ultimately how they act on such a message. '[I]t seems plausible that individual differences combine with incoming information (such as a fear appeal). This integrated information may influence perceptions of threat and efficacy, which may then interact to influence the acceptance or rejection of a fear appeal' (ibid, 5–6).

In sum, if individual differences in, for instance, prior knowledge affect the outcomes of being exposed to a fear appeal message, the EPPM suggests that such differences only influence outcomes indirectly, as mediated by perceived threat and efficacy. Such an indirect effect would go through (*be mediated by*) a person's perception of the threat and his/her perception of the efficacy of the response.[2] However, individual differences may also be found to *directly* lead to differences in outcomes. If this is the case, it would imply that the relationship between individual differences and perceptions of threat and/or efficacy does not account for the full effect of individual differences and fear appeal outcomes, as the EPPM predicts. As mentioned earlier, Popova (2012, 468) asserts that according to the EPPM individual

differences in previous emotions and cognitions affect message processing, but that it is not clear yet how, for instance, familiarity with the threat and/or responses would influence the message.

The undecided state of affairs regarding the role of prior knowledge leads us to the following research questions (RQs):

> RQ1: To what extent is receivers' prior knowledge of threat information and efficacy information in a fear appeal message associated with fear appeal outcomes, i.e., receivers' attitudes and intentions?
>
> RQ2: If receivers' prior knowledge of threat information or efficacy information in a fear appeal message is associated with fear appeal outcomes, are these associations mediated by perceived threat and perceived efficacy, respectively?

METHOD

Two related studies, based on the tenets of the EPPM, were conducted among female university students.[3] To reduce the possibility that results would only apply to one particular health topic, messages were created about two different threats facing young women: chlamydia (a sexually transmitted disease) and alcohol abuse. These topics were carefully selected so to generate fear in the specific target group (Averbeck, Jones and Robertson 2011; Beck and Frankel 1981). Females are genuinely at risk of these health threats as they are biologically more likely to contract chlamydia (CDC 2012a) and more prone to suffer the effects of alcohol abuse than men, if they do not follow the recommended responses (CDC 2012b). The Persuasive Health Message Framework (Witte, Meyer and Martell 2001) served as the rationale to develop the messages for both studies. The messages were presented to readers from the target groups, and variables were measured that could specify how prior knowledge, threat and efficacy perceptions, attitudes and intentions were related.

Participants

Young Dutch females (mostly students, all speakers of English as a second language) were asked to participate. Participants were recruited by student assistants at the Department of Communication and Information Sciences at the University of Groningen (RUG) in the Netherlands. Students who followed or had followed a course in Health Communication were excluded from participation.

In total, 116 females participated (chlamydia: $n = 57$; alcohol abuse: $n = 59$). The average age of the chlamydia sample was 21.81 years ($SD = 4.85$), ranging from 16–54. In this sample, 82.5 per cent followed a Bachelor's or Master's degree course at RUG ($n = 47$), 14 per cent identified their course as 'other' ($n = 8$) and 3.5 per cent ($n = 2$) did not complete this question. The average age of the alcohol abuse sample was 21.75 years ($SD = 2.89$), ranging from 18–34. Here, 98.3 per cent followed a

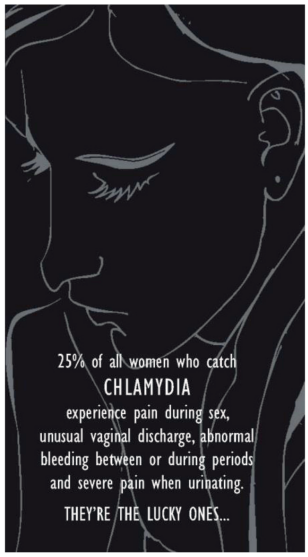
Bachelor's or Master's degree course at RUG (n = 58) and one participant (1.7%) identified her course as 'other' .

Materials

The messages were designed as two four-page brochures with the same 'look and feel', so as to be able to draw comparisons between the findings. All texts in the brochures were in English. The brochures each consisted of a front page with pull quotes to attract attention to the health topic at hand. The front pages of both brochures contained the same black-and-white picture of a female in the background.

The centre-spread of both brochures included a number of scary pictures as well as textual information related to the severity and susceptibility components of the health topics. Detailed references to the effects of chlamydia (e.g., infertility) and alcohol abuse (e.g., breast cancer) were made to emphasise the severity thereof. To accentuate susceptibility, specific references were repeatedly made to the target audience (i.e., young females) and how their gender made them specifically vulnerable to contracting chlamydia, or prone to the effects of alcohol abuse. The back pages of both brochures contained information about the response efficacy component and a statement about the self-efficacy component of the two health topics. In the chlamydia brochure, the advice referred to abstinence, monogamy, condom use and annual screening; in the alcohol abuse brochure, the advice was not to drink at all, or else to keep to a limit of two units per day. Both brochures had a 'pay-off' or 'send-off' line on the back page, encapsulating the essence of the health message by asking the reader what her choice will be (i.e., to prevent or fail to prevent the threat presented in the brochure).

Draft versions of the brochures were presented to small groups of females (chlamydia: n = 10; alcohol abuse: n = 8) who were similar to, but not included in, the group of participants in the main studies. The participants' reactions suggested a need to add credible and real sources for the information in both brochures. For the chlamydia brochure, a more elaborate explanation of the disease was requested, and a restriction in the use of medical jargon. These suggestions were followed in developing the final versions of the brochures (see Figures 1 and 2).



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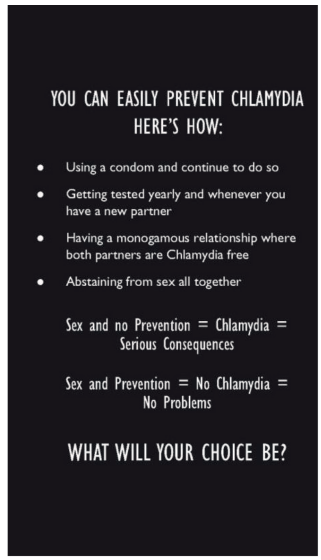

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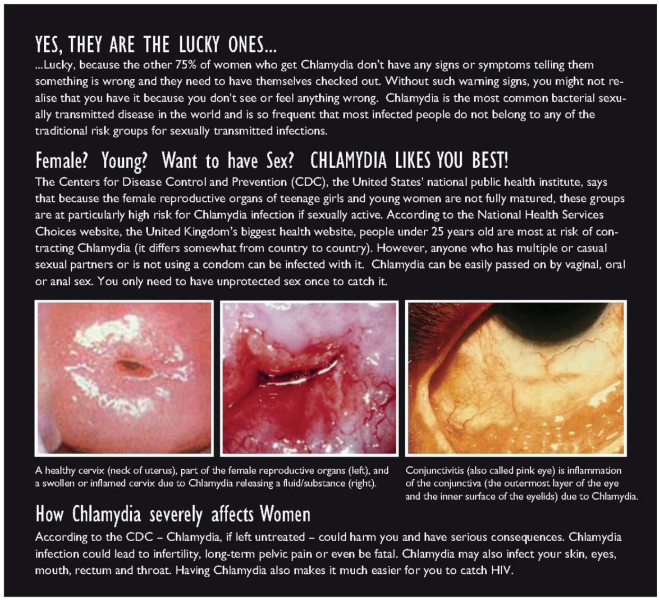
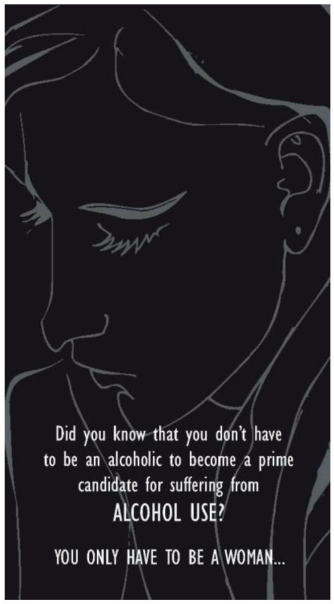
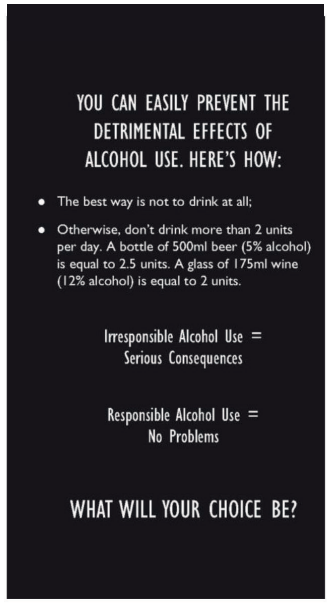


Centre-spread

Figure 1: Front, back and centre-spread of the final version of the chlamydia brochure



Front



Back

Centre-spread

Figure 2: Front, back and centre-spread of the final version of the alcohol abuse brochure

Measures

Items and scales measuring fear arousal, perceived threat (average score of perceived susceptibility and perceived severity), perceived response efficacy, attitudes and intentions were modelled on items from the often used Risk Behavior Diagnosis Scale (Witte n.d.; Witte, Cameron and McKeon et al. 1996; Witte, Meyer and Martell 2001). Levels of prior knowledge about the threat and the response efficacy were measured with items starting with 'Before you read this brochure, had you heard that […]' (see below). All questions and instructions were presented in English.

Fear

Fear arousal was measured by asking participants to rate five different items on a 7-point scale (1 = *not at all*; 7 = *very much*) in both studies: 'Did this brochure make you feel frightened/tense/nervous/anxious/uncomfortable?' (chlamydia study: α = .88; alcohol abuse study: α = .89).

Threat (susceptibility and severity)

Participants responded to the various items measuring perceived susceptibility and perceived severity on a 7-point scale (1 = *strongly disagree*; 7 = *strongly agree*). To measure perceived susceptibility, participants in both studies responded to three items: 'I am at risk of getting infected with chlamydia'; 'It is possible that I will get affected with chlamydia'; 'It is likely that I will get affected with chlamydia' (α = .82) and 'I am at risk of the harmful effects of alcohol use'; 'It is likely that I will be affected by the harmful effects of alcohol use' and 'It is possible that I will be affected by the harmful effects of alcohol use' (α = .91).

To measure perceived severity, participants in both studies were asked to indicate how much they agreed with three items: 'I believe chlamydia is a severe health problem'; 'I believe chlamydia is a significant health threat' and 'I believe chlamydia is damaging to general health' (α = .93), and 'I believe the harmful effects of alcohol use are a severe health problem'; 'I believe the harmful effects of alcohol use are a significant health threat' and 'I believe the harmful effects of alcohol use are damaging to general health' (α = .89).

Response efficacy

Participants responded to the various items measuring perceived response efficacy on a 7-point scale (1 = *strongly disagree*; 7 = *strongly agree*). Beliefs about the degree to which the recommended responses effectively avert the threat from occurring were measured by listing the different prevention options available in the brochures. In both studies, participants responded to two items per recommended response. In the chlamydia study response efficacy items were the following: 'Abstinence/being

in a monogamous relationship (in which both partners are chlamydia-free)/Using condoms/getting tested yearly and whenever you have a new partner is effective in preventing chlamydia' and 'Abstinence/being in a monogamous relationship (in which both partners are chlamydia-free)/using condoms/getting tested yearly and whenever you have a new partner is a good way to prevent chlamydia' (α = .67; .84; .97 and .88 respectively). In the alcohol abuse study response efficacy items were the following: 'Adhering to the recommended daily limit of two alcohol units/drinking no alcohol is effective in preventing the harmful effects of alcohol use' and 'Adhering to the recommended daily limit of two alcohol units/drinking no alcohol is a good way to prevent the harmful effects of alcohol use' (α = .80 and .92 respectively).[4]

Attitudes

In each study, two separate items measured each of the recommended responses using two different 7-point scales. In the chlamydia study, participants rated the items 'Thinking that abstinence/having a monogamous relationship/using condoms/getting tested yearly and whenever you have a new partner is effective in preventing chlamydia is' from 1 = very unintelligent to 7= very intelligent, and 'The idea that abstinence/having a monogamous relationship/using condoms/getting tested yearly and whenever you have a new partner is effective in preventing chlamydia is' from 1 = very bad to 7= very good (α = .73; .91; .95 and .95, respectively). In the alcohol abuse study, participants rated the items 'Thinking that adhering to the recommended daily limit of two alcohol units/drinking no alcohol is effective in preventing the harmful effects of alcohol use' is from 1 = *very unintelligent* to 7 = *very intelligent.* 'The idea that adhering to the recommended daily limit of two alcohol units/drinking no alcohol is a good way to prevent the harmful effects of alcohol use' is from 1 = *very bad* to 7 = *very good* (α = .91 and .73 respectively).

Intentions

In both studies, one item measured the intention toward each of the recommended responses using a 7-point scale (1 = *strongly disagree*; 7 = *strongly agree*): 'I plan to abstain from sex/have a monogamous relationship/use condoms/get tested yearly and whenever I have a new partner in order to prevent chlamydia' and 'I plan to adhere to the recommended daily limit of alcohol intake/not to drink in order to prevent the harmful effects of alcohol use', respectively.

Prior knowledge

The level of prior knowledge related to the message information about the threat and the response efficacy was measured with items that all started with 'Before you read this brochure, had you heard that […]?' Participants responded to items on a 7-point

scale (1 = *not at all*; 7 = *yes, I did*). The wording used for this item was congruent with the way prior knowledge was measured in Steffen (1990, 686 and 688): 'Have you heard of testicle cancer/the testicle self-exam before today?'

Participants were asked about prior knowledge in *hindsight*. This is in contrast to procedures in some other studies where prior knowledge was assessed *before* message exposure, to avoid the possible risk of a priming effect of reading the message (see, e.g., Morman 2000; Nabi, Roskos-Ewoldsen and Dillman Carpentier 2008). We were less convinced that reading the information in the brochure a couple of minutes before answering questions about it would influence the respondents' ability to remember what they knew beforehand. We were concerned, however, about the serious risk of a priming effect that questions asked before reading could have on the attention the participants would pay to specific topics in the brochure. The interval range for the response options of the prior knowledge scales used, gave participants leeway when appraising their level of familiarity with the information.

Prior knowledge of the threat information

Prior knowledge of the threat information was calculated as the average of prior knowledge of the susceptibility information and prior knowledge of the severity information. In both studies, participants responded to three susceptibility items each: 'Before you read this brochure, had you heard that you, being a young woman, are especially at risk of chlamydia/the harmful effects of alcohol use?'; 'Before you read this brochure, had you heard that you, being a young woman, are especially likely to be affected by chlamydia/the harmful effects of alcohol use?'; 'Before you read this brochure, had you heard that you, being a young woman, are especially prone to chlamydia/the harmful effects of alcohol use?' (α = .94 and .98, respectively).

In the chlamydia study, participants responded to six severity items measuring prior knowledge of the severity information: 'Before you read this brochure, had you heard of chlamydia being a severe health problem/being associated with pelvic pain/increasing the chances of contracting HIV/having a negative impact on the female genital system (e.g., cervix and fertility)/being associated with infection of body parts other than the female genital system (skin, eyes, mouth, rectum and throat)?' and 'Before you read this brochure, had you heard that chlamydia can be fatal?' (α = .73). In the alcohol abuse study, five items were used to measure prior knowledge of the severity information: 'Before you read this brochure, had you heard of alcohol use boosting the risk of breast cancer/being associated with skin problems/having a negative impact on human organs (heart, liver and brain) and the female genital system (e.g. menstrual cycle and fertility)?' and 'Before you read this brochure, had you heard of the harmful effects of alcohol use being a severe health problem?' (α = .65).

Prior knowledge of the response efficacy information

In both studies, participants responded to one item per recommended response. In the chlamydia study these items were 'Before you read this brochure, had you heard that abstinence/being in a monogamous relationship (where both partners are chlamydia-free)/using condoms/getting tested yearly and whenever you have a new partner is effective in preventing chlamydia?' In the alcohol abuse study, the two items used to measure prior knowledge of the response efficacy information were 'Before you read this brochure, had you heard that adhering to the recommended daily limit of two alcohol units is effective in preventing the harmful effects of alcohol use?' and 'Before you read this brochure, had you heard that drinking no alcohol is effective in preventing the harmful effects of alcohol use?'

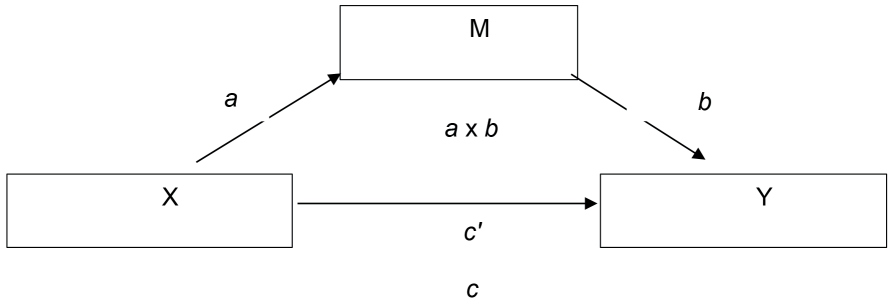
In view of the topics and target groups in these studies, it was decided not to measure the level of prior knowledge of the self-efficacy information. It seemed to make little sense to ask well-educated young Dutch females questions such as: 'Before you read this brochure, had you heard that you can easily abstain from drinking alcohol to prevent the harmful effects of alcohol use?' or 'Before you read this brochure, had you heard that you can easily stay in a monogamous relationship to prevent getting chlamydia?' Respondents might easily have regarded these questions as rather strange, and as a result scores would have been difficult to interpret.

Procedure

Participants were granted 20 minutes to read either the chlamydia or the alcohol abuse brochure before completing the related questionnaire. They returned all documents immediately after completion.

OVERVIEW OF STATISTICAL ANALYSES

After determining descriptive statistics and transforming scores in order to reduce skewness (see below), correlation coefficients were calculated to find possible associations between the level of prior knowledge of the threat and response efficacy information on the one hand, and attitudes and intentions on the other. A series of mediation analyses were subsequently performed to determine the extent to which significant associations would be mediated by perceived threat and perceived response efficacy (see Figure 3). In each analysis, first the total effect of variable X on variable Y was determined.[5] If prior knowledge was significantly associated with attitude or intention, the two components of the total effect were assessed. First, the indirect effect (a x b) through perceived threat and perceived response efficacy was determined (to what extent is X associated with Y through mediator variable M?), and second, the direct effect (c') was determined (to what extent is X associated with Y independently from M?).[6]



a x *b*: indirect effect

c': direct effect

c: total effect

Figure 3: Simple mediation model

Source: Hayes (2013, 85–122)

RESULTS

Tables 1 and 2 present the mean scores and standard deviations for the chlamydia study and the alcohol abuse study, respectively.

Table 1: Descriptive statistics for all variables in the chlamydia study (all variables measured on 7-point scales).

Variable	Number of items	M (SD)
Fear arousal	5	3.80 (1.33)
Perceived susceptibility	3	2.52 (1.32)
Perceived severity	3	5.08 (1.13)
Perceived threat		3.80 (0.97)
Perceived response efficacy		
Abstinence	2	4.47 (1.73)
Monogamy	2	5.53 (1.12)
Condoms	2	5.96 (1.13)
Annual screening	2	5.87 (0.94)

Variable	Number of items	M (SD)
Self-efficacy		
Abstinence	1	3.18 (1.67)
Monogamy	1	5.91 (1.28)
Condoms	1	5.55 (1.44)
Annual screening	1	5.05 (1.34)
Intentions		
Abstinence	1	1.91 (1.33)
Monogamy	1	5.13 (1.74)
Condoms	1	4.98 (1.65)
Annual screening	1	4.88 (1.48)
Attitudes		
Abstinence	2	4.20 (1.45)
Monogamy	2	5.34 (1.07)
Condoms	2	6.03 (0.97)
Annual screening	2	5.64 (1.12)
Prior knowledge Susceptibility	3	3.94 (1.66)
Prior knowledge severity	6	3.91 (1.13)
Prior knowledge threat		3.94 (1.26)
Prior knowledge response Efficacy		
Abstinence	1	5.23 (1.68)
Monogamy	1	5.62 (1.30)
Condoms	1	6.04 (1.08)
Annual screening	1	5.66 (1.33)

Table 2: Descriptive statistics for all variables in the alcohol abuse study (all variables measured on 7-point scales)

Variable	Number of items	M (SD)
Fear arousal	5	3.43 (1.38)
Perceived susceptibility	3	2.89 (1.40)
Perceived severity	3	5.50 (0.93)
Perceived threat		4.19 (0.85)

Variable	Number of items	M (SD)
Perceived response efficacy		
No alcohol	2	6.10 (1.38)
Daily limit	2	5.01 (1.25)
Self-efficacy		
No alcohol	1	5.31 (1.82)
Daily limit	1	5.80 (1.52)
Intentions		
No alcohol	1	3.49 (2.01)
Daily limit	1	4.29 (1.93)
Attitudes		
No alcohol	2	5.85 (1.36)
Daily limit	2	5.03 (1.35)
Prior knowledge Susceptibility	3	2.16 (1.65)
Prior knowledge severity	5	4.31 (1.10)
Prior knowledge threat		3.24 (1.23)
Prior knowledge response efficacy		
No alcohol	1	6.37 (1.11)
Daily limit	1	5.47 (1.58)

In view of the high mean scores (>5) for a number of variables and the low mean scores (< 3) for other variables in Tables 1 and 2, all distributions were tested for skewness. For five variables in Table 1 and six in Table 2, skewness in the score distributions was found to exceed the criterion ($-1 < \text{skewness} < 1$).[7] In view of the correlation-based analyses to follow, it was decided to log-transform scores for all variables.[8] After this, for the variable 'prior knowledge of response efficacy of drinking no alcohol' skewness still exceeded the criterion. This variable was therefore not used in further analyses.[9]

Tables 3 and 4 present the correlations between log-transformed prior knowledge variables on the one hand and possibly related log-transformed attitudes and intentions on the other, for the chlamydia study and the alcohol abuse study respectively.

Table 3: Correlations between log-transformed scores for prior knowledge variables and log-transformed scores for attitudes and intentions in the chlamydia study

	Prior knowledge threat	**Prior knowledge response efficacy Abstinence**	**Prior knowledge response efficacy Monogamy**	**Prior knowledge response efficacy Condoms**	**Prior knowledge response Annual screening**
Attitude Abstinence	-.01	.36**			
Attitude Monogamy	.20		.48**		
Attitude Condoms	-.03			.60**	
Attitude Annual screening	-.04				.45**
Abstinence Intention	-.13	-.30*			
Monogamy Intention	.27*		.32*		
Condoms Intention	-.03			.02	
Annual screening Intention	.01				.31*

** p < .05 ** p < .01*

Table 3 shows that in one case, prior knowledge of the threat information was positively associated with intention (monogamy). In four cases, prior knowledge of the efficacy of a possible response (abstinence, monogamy, condom use, annual screening) was positively associated with attitude toward this response. In two cases, prior knowledge of the efficacy of a possible response (monogamy, annual screening) was positively associated with intention regarding this response, and in one case (abstinence) a negative relationship was found between prior efficacy knowledge and intention regarding this response.

Table 4: Correlations between log-transformed scores for prior knowledge (PN) variables and log-transformed scores for attitudes and intentions in the alcohol abuse study

	Prior knowledge threat	**Prior knowledge response efficacy Daily limit**
Attitude No alcohol	-.09	
No alcohol Intention	-.08	
Attitude Daily limit	.13	.27*
Daily limit Intention	-.02	.16

* $p < .05$

Table 4 shows that prior knowledge of the threat information was neither associated with attitude nor intention regarding adhering to a daily limit. Prior knowledge of the information about the efficacy of adhering to a daily limit was positively associated with attitude toward this response; such prior knowledge was not associated with intention, however.

In both studies, in all cases where significant correlations were found between prior knowledge variables and attitudes or intentions, mediation analyses were performed using perceived threat and perceived response efficacy as possible mediators. For all variables in these analyses, log-transformed scores were used. Tables 5 and 6 present the outcomes of the mediation analyses.

Table 5: Outcomes of mediation analyses: Chlamydia study

Association	**Total effect**	**Direct effect**	**Indirect effect**
Prior Knowledge Threat and Monogamy Intention, through Threat	.50*	.51	.01
Prior Knowledge Response Efficacy Abstinence and Attitude toward Abstinence, through Perceived Response Efficacy Abstinence	.21**	.02	.19+
Prior Knowledge Response Efficacy Abstinence and Abstinence Intention, through Perceived Response Efficacy Abstinence	-.26*	-.25*	-.01
Prior Knowledge Response Efficacy Monogamy and Attitude toward Monogamy, through Perceived Response Efficacy Monogamy	.40**	.30*	.09

Association	Total effect	Direct effect	Indirect effect
Prior Knowledge Response Efficacy Monogamy and Monogamy Intention, through Perceived Response Efficacy Monogamy	.38*	.53**	-.15
Prior Knowledge Response Efficacy Condoms and Attitude toward Condoms, through Perceived Response Efficacy Condoms	.56**	.35**	.20+
Prior Knowledge Response Efficacy Annual Screening and Attitude toward Annual Screening, through Perceived Response Efficacy Annual Screening	.42*	.22	.20
Prior Knowledge Response Efficacy Annual Screening and Annual Screening Intention, through Perceived Response Efficacy Annual Screening	.31*	.24	.06

** p < .05 ** p < .01 + significant*[10]

As Table 5 shows, in three out of eight cases where significant associations were found between prior knowledge variables and attitudes or intentions, only significant direct effects were found, in one case only a significant indirect effect was found, in one case both a significant direct effect and a significant indirect effect were found, and in three other cases there were neither significant direct nor indirect effects. In the two cases where a significant indirect effect was found, both the associations between prior knowledge and the mediator, and the associations between the mediator and attitude, were positive.

Table 6: Outcomes of mediation analyses: alcohol abuse study

Association	Total effect	Direct effect	Indirect effect
Prior Knowledge Response Efficacy Daily Limit and Attitude toward Daily Limit, through Perceived Response Efficacy Daily Limit	.22*	.15	.06

** p < .05*

Table 6 shows that in the one case where a significant association was found between a prior knowledge variable and attitudes or intentions (attitude toward adhering to a daily limit), there was neither a significant direct nor indirect effect.

DISCUSSION

The two studies presented here aimed to find possible associations of prior knowledge of threat and efficacy information in a fear appeal message, with the receivers'

attitudes and intentions related to the message. For prior knowledge of the threat information only one such association was found: in the chlamydia study, prior knowledge of the threat information was positively correlated with the intention to have a monogamous relationship. Prior knowledge of efficacy information was found to play a more important role. In the chlamydia study, prior knowledge of the efficacy of four possible responses was always positively associated with attitude toward this response. In this study, in two cases prior efficacy knowledge was also positively associated with intention, and in one case there was a negative relationship between prior efficacy knowledge and intention. In the alcohol abuse study, there was a positive relationship between prior efficacy knowledge and intention to adhere to a daily limit of alcohol intake.

In contrast to what the EPPM suggests, not all associations that were found could be explained as indirect effects, mediated by perceived threat or perceived efficacy. The picture is more diverse. In one case the association between prior knowledge and attitude proved to be almost fully mediated by perceived efficacy, and in one other case both significant indirect and direct effects were found. In three other cases, however, only significant direct effects were found, and in four cases there was neither a significant indirect nor a direct effect.

The results from these two studies show differences that may be related to the different health themes addressed. Chlamydia, for instance, may result from one unprotected sexual encounter; alcohol leads to serious health problems after chronic abuse. Findings from both studies, however, suggest that for readers' reactions to a fear appeal message prior knowledge of threat information is hardly relevant, while prior knowledge of efficacy information proved to play a role, most often in a positive way. The tendency of knowledgeable receivers of a persuasive message to generate pro-message arguments consistent with a positive existing attitude – specifically toward advice provided in a message – serves as a possible explanation. Findings from both studies furthermore suggest that the EPPM may be incorrect in assuming that individual differences – in this case, in prior knowledge – may only affect fear appeal outcomes in an indirect way, that is through different perceptions of threat and efficacy.

Clearly, these outcomes warrant further research into the varying ways in which prior knowledge may be associated with fear appeal outcomes. It could be, for instance, that prior knowledge is indicative of involvement with the topic at hand, and that this involvement may play an important role in the processing and outcomes of the fear appeal message. Further, the correlational set-up of the present studies only allowed for finding associations between prior knowledge and fear appeal outcomes. In new studies based on an experimental design, possible causal relationships could be established between the variables that we found to be related.

A limitation in both studies may be that for the recommended responses relatively high levels of prior knowledge were reported, while for other variables relatively

low scores were found. This may indicate ceiling or floor effects respectively, constraining the possible variation in the prior knowledge scores. Although high levels of skewness in the distributions were eliminated by log-transforming all scores, in a number of cases the resulting distributions were still moderately skewed. It is possible that this led to slightly distorted outcomes of the analyses. Another limitation relates to the limited number of participants in both studies. As a consequence, with medium effect size (r = .30), the statistical power of the correlations tests did not exceed .63. The circumstance, however, that not just one but two related studies were performed adds to the validity of the conclusions. Also, the way we measured the level of prior knowledge of the message information (i.e., after reading about it in the brochure) can be critiqued for possibly compromising the validity of the data to some extent. When a participant is asked to remember what s/he knew after being presented with information, it is possible that his/her recollection may no longer be completely correct.

Our studies concentrated on the effects of prior knowledge concerning the content of a fear appeal message. A potential avenue for further investigation could be to study levels of familiarity with brochure *design*, and the way this may be associated with readers' reactions. This aspect did not fall within the ambit of the current research. The different relationships between (prior knowledge of) the graphical material, the grammatical forms and rhetorical styles employed in the language, and the use of typography could, for example, be further scrutinised.

Despite their limitations, the two studies presented here add to the theoretical understanding of the extent to which, and the way in which, a person's reactions to a fear appeal message may be related to individual differences in prior knowledge of the threat and efficacy information. Furthermore, the findings may be of practical relevance to fear appeal message designers. Popova (2012, 469) contends that for the EPPM to be a useful guide in developing a communication campaign, the audience's awareness of the threat and possible solutions should be measured, and depending on the outcomes of these measurements different interventions should be used. Based on the outcomes of our studies, this advice to designers may be specified as stressing information that is familiar to the target group when presenting measures to avert a threat, and not to hesitate to use different messages with the same response information. Seemingly, fear appeals work better if people perceive the included response information as measures they already knew about.

NOTES

1. For critical reviews of the EPPM, see De Hoog, Stroebe and De Wit (2007); Popova (2012); Ruiter, Abraham and Kok (2001) and So (2013).
2. For a discussion and explanation of mediation, see Baron and Kenny (1986); Hayes (2009; 2013).

3. According to Tannenbaum et al. (2015, 1196 and 1198), in the most recent meta-analysis of fear appeal studies, fear appeals are more effective for target audiences with a larger percentage of female respondents.
4. In each study there was one question per recommended response into self-efficacy, e.g., 'I can easily abstain from sex to prevent getting chlamydia' and 'I can easily abstain from drinking alcohol in order to prevent the harmful effects of alcohol use'. In view of the decision not to measure the level of prior knowledge of the self-efficacy information in the brochures, the scores on these self-efficacy variables were not used in the analyses.
5. The authors are aware that the terms 'total effect', 'indirect effect' and 'direct effect' may suggest a causal relationship between the variables involved, while strictly speaking the regression analyses that the mediation analyses are based on, do not permit cause–effect conclusions. In the literature on mediation analyses, however, it is conventional to use this terminology.
6. Even when there is no significant total effect of X on Y, there may be an indirect effect of X on Y, e.g., if one or more indirect paths carry the effect and those paths operate in opposite directions (Hayes 2009, 413–414). In our studies, however, we were only interested in the possible decomposition of a total effect if such a total effect actually proved to exist, that is if the level of prior knowledge proved to be significantly associated with attitudes or intentions.
7. As a rough guide, a distribution with a skewness in absolute value greater than 1 may be regarded as highly skewed. If the absolute value of skewness is between 0.5 and 1 the distribution is moderately skewed, and if the absolute value of skewness is below 0.5 the distribution is fairly symmetrical (Bulmer 1967; 1979, 63).
8. In case of positive skewness, scores (s) were log10-transformed into s*. In case of negative skewness, the following formula including double reflection was applied: s*=1-lg10(8-s) (see Field 2009, 155).
9. Of the 27 variables used in further analyses, 12 (7 in the chlamydia study; 5 in the alcohol abuse study) were moderately skewed. For 15 variables (11 in the chlamydia study; 4 in the alcohol abuse study), distributions were fairly symmetrical.
10. The macro used to test the simple mediation model does not provide p-values for indirect effects. According to Hayes (2013, 109), however, if the 95 per cent confidence interval (CI) does not contain and is entirely above zero, there is clear evidence that the indirect effect is positive to a statistically significant degree.

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